Stated Meeting, November 15, 1867.

Present, fifteen members.

Prof. CRESSON, Vice-President, in the Chair.

Letters were read from the Central Physical Observatory of Russia, St. Petersburg, October 10, 1866, and from the Society of Physics and Natural History of Geneva, July 15, 1867, accompanying donations for the Library; from the Imperial Academy of Sciences at Vienna, and from Prof. Hyrtl, October 28 and 30, and November 15, 1865; and from M. Rokitansky, dated Vienna, November 2, 1865; also, from the Linnæan Society of London, June 20, 1867, severally acknowledging the receipt of publications of the Society.

A letter was read, also, from the Secretary of the Royal Institution of London, dated September 29, 1867, announcing the death of Prof. Faraday, on the 25th of August, 1867, in the 79th year of his age; and a communication from J. H. Sharman, dated Montreux Vaud, Switzerland, October 25, 1867, informing the Society of the death of M. A. Morlot, one of its members.

Donations for the Library were announced: From the Central Physical Observatory of Russia; from the Nicolai, chief Observatory of St. Petersburg; from the Royal Observatory of Hobart Town; from the Imperial Academy of Sciences, and the Imperial Geographical Society of St. Petersburg; from the Royal Society of Tasmania, and the Royal Society of Victoria; from the Physical and Natural History Society of Geneva; from the Geographical Society of Paris; from the Linnæan, the Chemical, and the Royal Geographical Societies of London; from the Royal Geological Society of Ireland; from Prof. S. Newcomb, of the Observatory at Washington, D. C.; from Yale College, New Haven; from the Literary and Historical Society of Quebec; from D. Humphreys Storer, M.D.; from Geo. B. Wood, M.D., Philadelphia, and the Historical Society of Pennsylvania.

The following communication was read from Prof. James McClune, reporting his observations on the meteors of the 4th inst., made at the High School Observatory in this city.

Meteors of the 14th of November, 1867.

The meteors were observed by myself and assistants, from one o'clock until six o'clock, A.M., with the following results:

12	meteors	were	observed	between one and two o'clock.
78	"	"	"	between two and three "
364	"	"	"	between three and four "
2110	"	"	"	between four and five "
480	"	"	"	between five and six "

Whole number three thousand and forty-four.

Maximum of frequency, 28 to 29 minutes past four o'clock, when seventy-three were counted. Almost all of them appeared to radiate from a point near to Gamma Leonis, though some were observed in other constellations.

We succeeded in tracing the course of several of them on a map, and of noting the period of duration of a few. This in no instance exceeded ten seconds. In most instances, the most brilliant disappeared in less than five seconds.

The greater part of the brightest exhibited an orange tinge just before disappearing, while a few assumed a greenish hue.

The line of light which they described in their course disappeared gradually rather than instantaneously, as is the case with the trace made by the ordinary "shooting stars."

A large number took a southeasterly direction; but the greater portion of the brightest appeared to take a north, or northwesterly course.

The strong light of the moon prevented many from being seen, and I have no doubt that we could have counted as many between three and four o'clock, as we did between five and six, if the point of radiation had been as far above the horizon, and the moon as far distant from that point.

The course of a comparatively small number was serpentine, while three or four described a curve approaching a spiral form.

Does not the appearance of these meteors prove, that they are bodies revolving around the sun, and appearing in the greatest number, at least in America, after an interval of *thirty-four years?*

Mr. P. E. Chase related his observations of the same meteoric display, made at Haverford College, eight and a half miles west of Philadelphia, viz.:

Prof. Gummere organized a corps of students, who commenced their watch on the evening of the 13th, at half-past 10 o'clock. When I went upon the field, about 2h. 30m. A.M., I found that nearly 150 meteors had been seen during the previous four hours. They continued to fall at a slowly increasing rate until 3h. 30m., a large proportion being of more than usual brilliancy, and nearly all radiating from the constellation Leo. The increase then became more rapid; by 4h. more than 700 had been seen, and a few minutes later the flight was so continuous that the count exceeded 1000, and all further attempts at registering ceased. The display reached its maximum about 4h. 25m., when, with Leo in the centre of my field of vision, I counted 140 in a single minute. There were then evidently many more in the eastern than in the western portions of the heavens, and I judged that I could see at least a third of the whole number that were visible at the time. At 4h. 30m. a remarkable meteor started from Regulus, moving southwesterly, and leaving a very persistent train. After some seconds, two or three of the company took out their watches, and the train remained visible for more than three minutes, slowly rotating through a full quarter revolution before disappearing. It gradually curved while rotating, and just before vanishing it represented an arc of about 120°, looking like a wisp of fleecy cloud. This seemed to indicate a complete revolution, in about 15 minutes, of that portion of the meteoric atmosphere from which the tail was thrown off.

Mr. Marsh observed the same phenomenon at Germantown, six miles north of this city, and gave an account of the prominent characteristics as noticed by him.

Prof. Kendall gave an account of the observations made by himself and a number of his students, at the University of Pennsylvania, in Philadelphia.

Mr. Fraley called the attention of the Society to a model, now on exhibition in this city, affording a complete represen-

tation of the manner of mining coal, showing the various operations in detail with the late improvements introduced.

Mr. P. E. Chase made a communication on the specific magnetism of iron.

In my communication on the numerical relations of gravity and magnetism (Trans. A. P. S., vol. xiii, p. 126), after adducing various evidences of a correlation that had been long suspected, I endeavored to obtain approximate valuations for the constant factor, K, which was introduced in the comparison of the tidal forces with the force of equilibrium. These approximations led me to "suggest the propriety of considering the element of density (or of its correlative, the square of the time of molecular diffusion), in connection with both A and M."

In the year after this suggestion was made, Dr. Menzzer announced, as an experimental result (Poggendorff's Annalen, Nov. 1865; P. Mag., xxx, 456), that "the magnetizing powers of two coils which give the maximum of intensity are as the square roots of their weights." It therefore appears,

1. From Graham's and other well-known laws:
   Elasticity $\propto$ specific heat $\propto$ (wave-velocity).^{2}
   Density $\propto$ (time of molecular diffusion).^{2}
   Weight $\propto$ (time of sonorous vibration).^{2}
2. From observations on terrestrial magnetism:
   Tidal differences $\propto$ (magnetic differences).^{2}
   Magnetic variation $\propto$ (time).^{2}
3. From Menzzer's experiments:
   Weight $\propto$ (magnetizing power).^{2}

This indirect confirmation, of a conjecture which was at first based on a plausible analogy, encourages me to hope that the following comparisons between molecular and cosmical kinetic values may help to explain the specific magnetism of iron.

According to Tredgold, iron may be elongated about $\frac{1}{1400}$ without permanent alteration of structure. Now the ratio, at the earth's surface, of solar to terrestrial attraction, is about $\frac{1}{1640}$, and four times the ratio of the specific gravity of air to that of iron varies, approximately, between $\frac{1}{1400}$ and $\frac{1}{1700}$. Although this range of variation is somewhat more than $\frac{1}{5}$ of the least value, or about $\frac{1}{8000}$ of the total force, it is but little greater than Helmholtz found in the vibration-ratios for the first overtone of a series of tuning-forks (5.8 to 6.6 times the fundamental), while it is much less than the daily fluc-

tuation in the terrestrial magnetic force, which appears to be intimately connected with the joint action of atmospheric elasticity and solar differential-tidal attraction.

The coefficient of atmospheric specific gravity, 4, suggests the ratio of the length of a sonant aerial column to that of an equivalent sonorous wave, as well as the time of a complete oscillation of each magnetic pulse. During each vibration, from a maximum of condensation across the position of equilibrium to minimum, or *vice versâ*, the effect produced by any constant force would be four times as great as during the half oscillation, from either extreme to the point of equilibrium. The ratios of wave-velocity to elasticity and density, and of revolution to distance from the centre of motion, point to various experiments upon the relations of magnetic capacity to tenacity, in iron, and of magnetizing power to specific gravity or to specific heat,* in coils of different metals. If such experiments should show any intimate connection between elasticity and specific magnetism (a result which it does not seem unreasonable to anticipate), some of the mystery in which an interesting physical fact is now shrouded will be happily dispelled.

The minutes of the last meeting of the Board of Officers and Council were read.

New nominations, Nos. 582, 583, 584, and 585, were read.

And the Society was adjourned.

Stated Meeting, December 6, 1867.

Present, nine members.

Prof. Cresson, Vice-President, in the Chair.

Letters were read from John Stuart Mill, dated Avignon, November 10, 1867, acknowledging the receipt of notice of his election as a member of the Society.

From the Holland Society of Sciences at Amsterdam, January 13, and May 25, 1866; the Royal Society of Sciences at Amsterdam, April 15, 1866; from the Royal Acad-

* The specific heats of iron, cobalt, and nickel are nearly the same, being each about 27 times that of hydrogen. Recently discovered cosmical affinities of hydrogen and iron, and the ratio between solar and terrestrial superficial gravitation, may, perhaps, some time lead to the recognition of a significance in relations which would now be generally regarded as fanciful and accidental.